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We claim:

**1.** A method for the producing substantially identical microscale metal or metal alloy structures, said method comprising the steps of:

- (a)** fabricating a microscale mold insert having a size and shape that are generally complementary to the size and shape of the desired microscale structures;
- (b)** etching away surface oxides, if any, from the microscale mold insert;
- (c)** coating the microscale mold insert with a bond inhibitor layer;
- (d)** heating a metal plate or a metal alloy plate and the microscale mold insert to a temperature between about 40% and about 90% of the melting point of the plate;
- (e)** pressing the heated plate and the heated microscale mold insert together to form an inverse image of the microscale mold insert in the plate; wherein the inverse image is complementary to the microscale mold insert to an accuracy within about 10 microns;
- (f)** repeating steps **(d)** and **(e)** a plurality of times using the same or a different coated microscale mold insert to produce a plurality of substantially identical high aspect ratio microscale metal or metal alloy structures.

**2.** A method as recited in Claim 1, additionally comprising the step of coating the microscale mold insert with a precursor layer; wherein the precursor layer promotes adhesion between the microscale mold insert and the bond inhibitor-layer.

3. A method as recited in Claim 2, wherein the precursor layer is selected from the group consisting of Ti, Cr, and W.
4. A method as recited in Claim 3, wherein the precursor layer comprises Ti.
5. A method as recited in Claim 1, wherein the bond inhibitor layer is selected from the group consisting of amorphous hydrocarbons, metal-containing amorphous hydrocarbons, amorphous silicon nitrides, metal-containing silicon nitrides, diamonds, metal carbides, metal borides, and metal nitrides.
6. A method as recited in Claim 2, wherein the precursor layer is deposited by sputtering.
7. A method as recited in Claim 2, wherein the precursor layer is deposited by evaporation deposition.
8. A method as recited in Claim 2, wherein the precursor layer is deposited by chemical vapor deposition.
9. A method as recited in Claim 1, wherein the bond-inhibitor layer is deposited by sputtering.
10. A method as recited in Claim 1, wherein the bond inhibitor layer is deposited by evaporation deposition.

- 11.** A method as recited in Claim 1, wherein the bond-inhibitor layer is deposited by hybrid physical/chemical vapor deposition.
- 12.** A method as recited in Claim 1, wherein the metal plate comprise a metal or metal alloy selected from the group consisting of Zn, Al, Al-alloys, Cu, Ni, Fe, and Ni-Fe alloys.
- 13.** A method as recited in Claim 1, wherein the metal plate comprises Al.
- 14.** A method as recited in Claim 1, wherein the metal plate comprises an Al-alloy.
- 15.** A method as recited in Claim 1, wherein the metal plate comprises Zn.
- 16.** A method as recited in Claim 1, wherein the inverse image is complementary to the microscale mold insert to an accuracy of less than about 1 micron.
- 17.** A microscale metal or metal alloy structure produced by the method of Claim 1.